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FUTURE CHALLENGES FOR LNG SHIPPING IN CHINA

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Abstract

This paper analyzed the world energy consumption trend and China's energy policy and future gas consumption with the conclusion that China will need 60 – 100 large LNG carriers for LNG import. The paper also introduced that the LNG imported to the coastal main LNG receiving terminals will be sent to the end users by pipeline, LNG truck and small size LNG vessels. All these factors indicated a great business opportunity in China for the LNG shipping industry.

This paper also analyzed the challenge faced by the rapid developing of the LNG industry in China, particularly the shortage of experienced participators.

This paper also gave an example on how China LNG Shipping (International) Co., Ltd (CLSICO) has managed the shortage of experienced shore and sea staff.

This paper concluded if the participators work together these challenges will be overcome obtaining a win in this industry.

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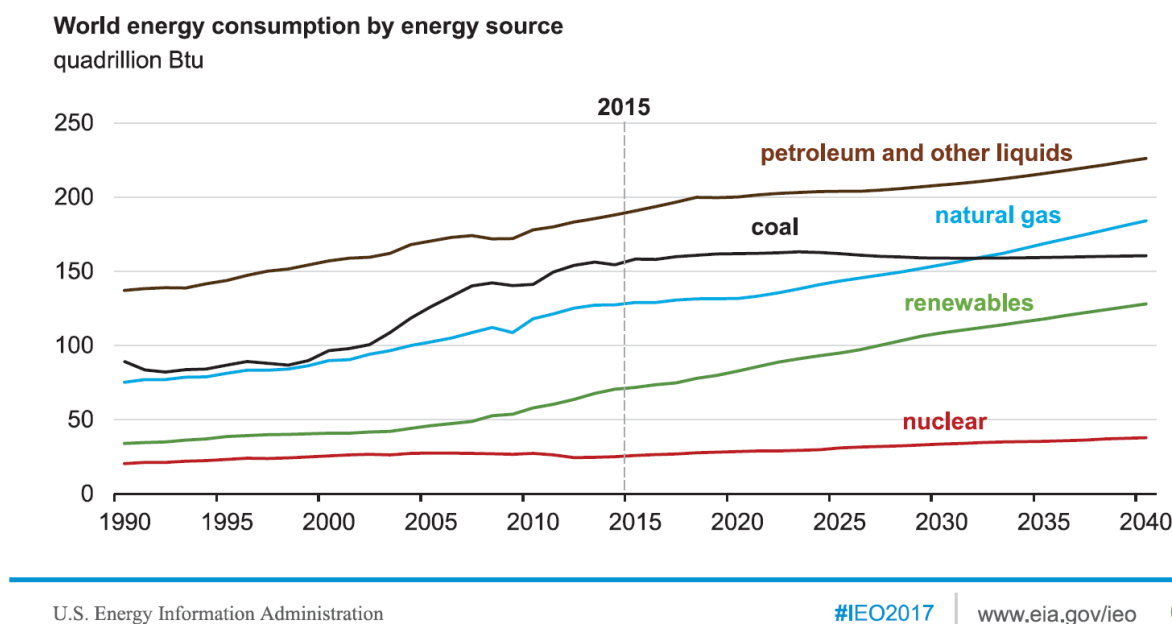
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1. Background and Context

1.1 Energy consumption in the world

In the past few decades, it has been seen significant growth across all regions in the amount of energy consumption in the world, to accommodate continuous expansion demand, and this trend will likely continue for a period of time in future.

Graph 1.1 World Energy Consumption by Energy Source



(Source: US Energy Information Administration)

According to the US Energy Information Administration's statistics, we can see a potential fast development in consumptions of renewable energy and natural gas, especially for natural gas, it is predicted to be the second largest energy consumption source by overtaking coal. Because natural gas is the cleanest and safest fossil fuel of all energy sources, it is playing an increasing significant role in helping to attain national goals of a cleaner environment, energy security and a more competitive economy for countries, especially for developing countries. According to a research project by Stifel, the emerging nations may account for more than a quarter of worldwide demand by 2030.

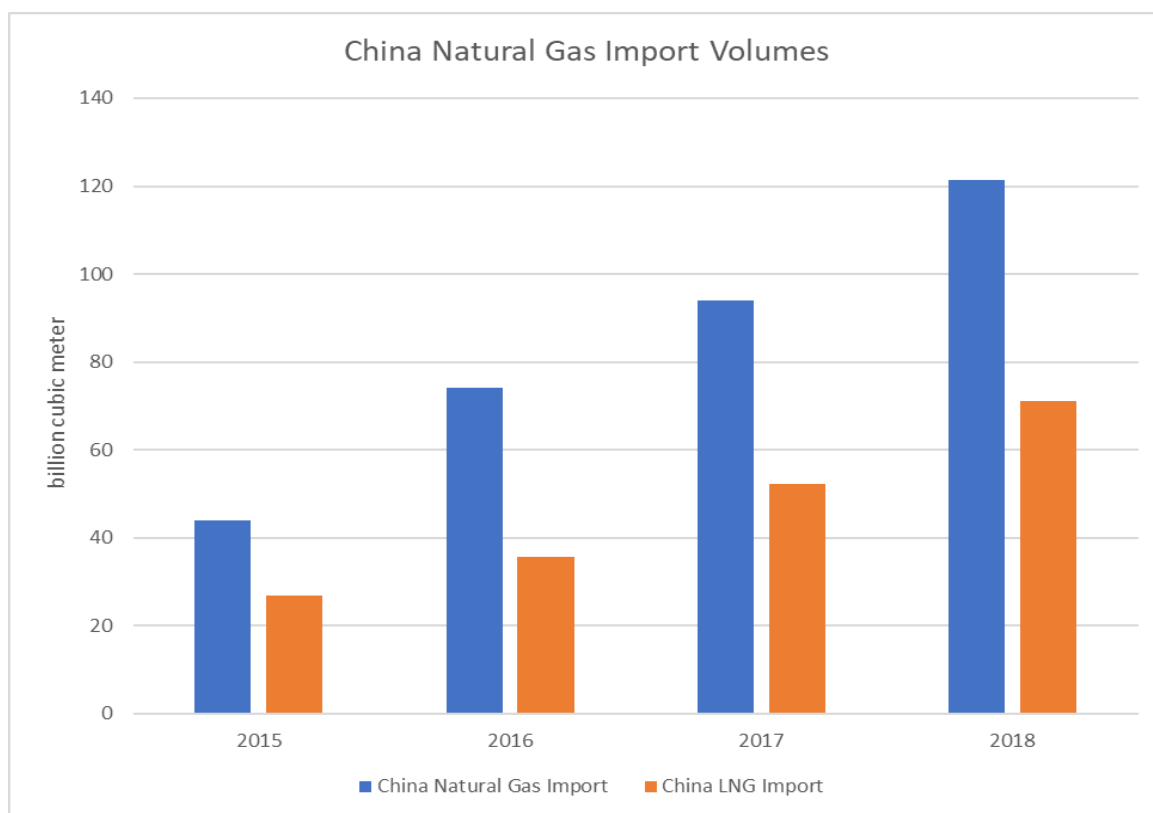
1.2 Energy Consumption in China

At present, coal consumption is still the biggest part of energy consumption in China. The result of relying heavily on coal supply is obvious: severe environmental pollution. The Chinese government already realized the importance, and actively promoted in utilizing more natural gas. According to a report on enforcement of air pollution legislation submitted to the National People's Congress on July 2018, the Chinese government is accelerating the process of coal-to-gas switching. In accordance with the plan, the usage of natural gas consumption will shift to 10% by 2020; and aims to approach 15% by 2030, which makes a huge demand in the supply of natural gas with the expectation of 700 billion cubic meters per year.

The figures released by the National Bureau of Statistics also represent that China has a vast demand for natural gas. By the end of the third quarter in 2018, apparent volume of natural gas consumption is 202 billion cubic meters, with year-on-year growth of 18.2%. China's natural gas consumption in the whole year is

expected to reach 270 billion cubic meters, but there is still a gap of 15 billion cubic meters between the demand and the market.

Graph 1.2 China Natural Gas Import Volumes



(Source: National Bureau of Statistics of China)

However, domestic production cannot be content with the social such a mass requirement.

Till the end of the third quarter of 2018, China has imported nearly 88.7 billion cubic meters, by the proportion of 44% of the apparent volume of natural gas consumption. Consequently, China is expected to continue importing natural gas in the form of LNG and from a number of new and proposed natural gas pipelines from neighboring countries with a strong policy support. The data from National Bureau of Statistics show that China's Natural Gas Import Volumes has maintained steady growth over the last few years at the average rate of more than 25%, for LNG the average rate is over 35%. Chinese gas demand looks set to continue to increase strongly in the year of 2019 and beyond hence in order to supply the predictable booming import volumes, more and more LNG carriers are involved in the market.

2. The opportunities for the LNG shipping industry

2.1 The demand of LNG fleet

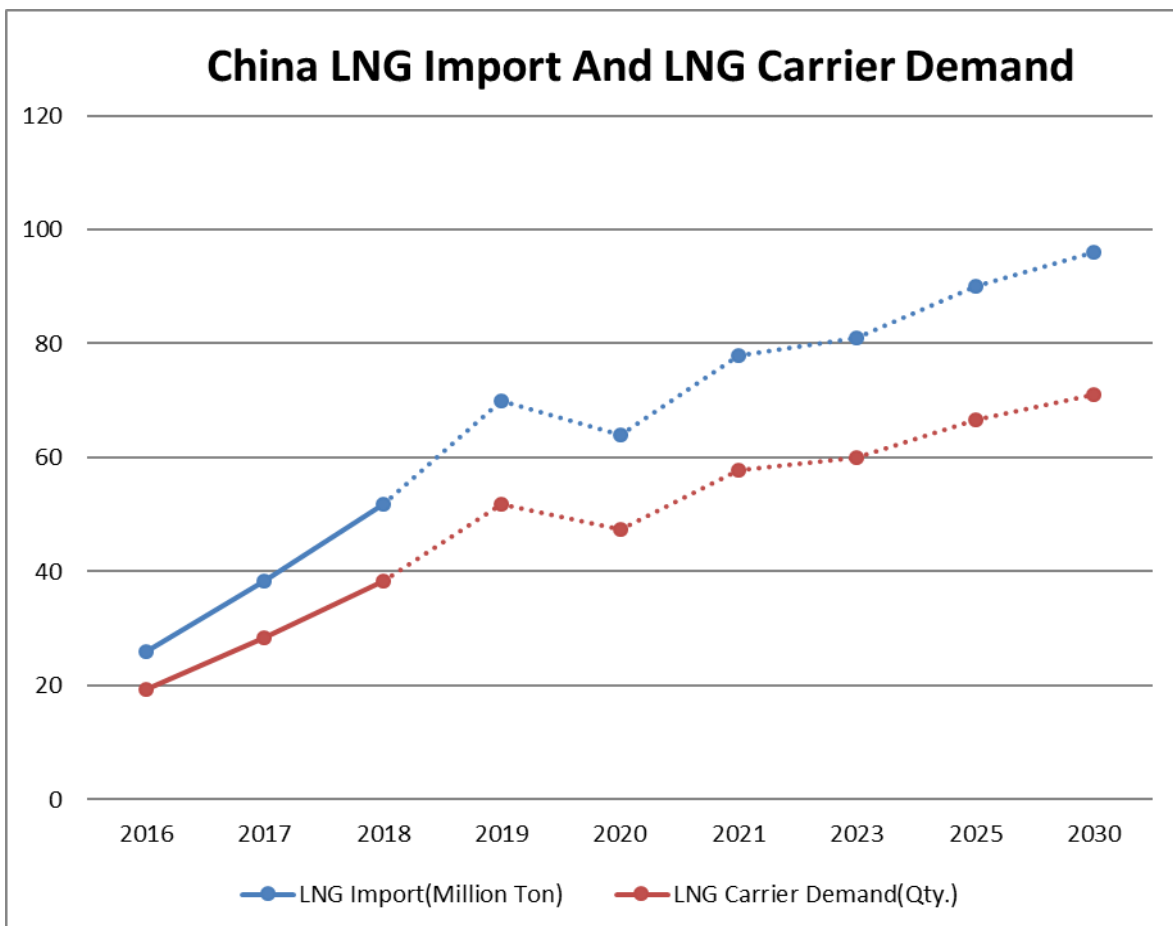
Driven by the continuous economic growth and the environmental protection requirement, not only for China but also for other countries in the world, natural gas demand will maintain high growth momentum in the future. LNG shipping is one of the important ways to fill the shortage of natural gas. Obviously, this will bring investment and development opportunities to LNG shipping enterprises and other related enterprises.

But at this stage, we have to acknowledge that the current fleet of Chinese LNG carriers is not sufficient enough, for the increasing import volume of LNG in China. Based on the current development of LNG import

volume, China is going to import 60 million to 100 million Tonnes of LNG per year in the future. A rough calculation indicates 60 to 100 LNG carriers are required. From the perspective of the global LNG carrier fleets, the number of Chinese LNG fleets appears to be “weak”.

Below graph showed the LNG import and the LNG carriers demand for China.

Graph 2.1 China LNG Import and LNG Carrier Demand

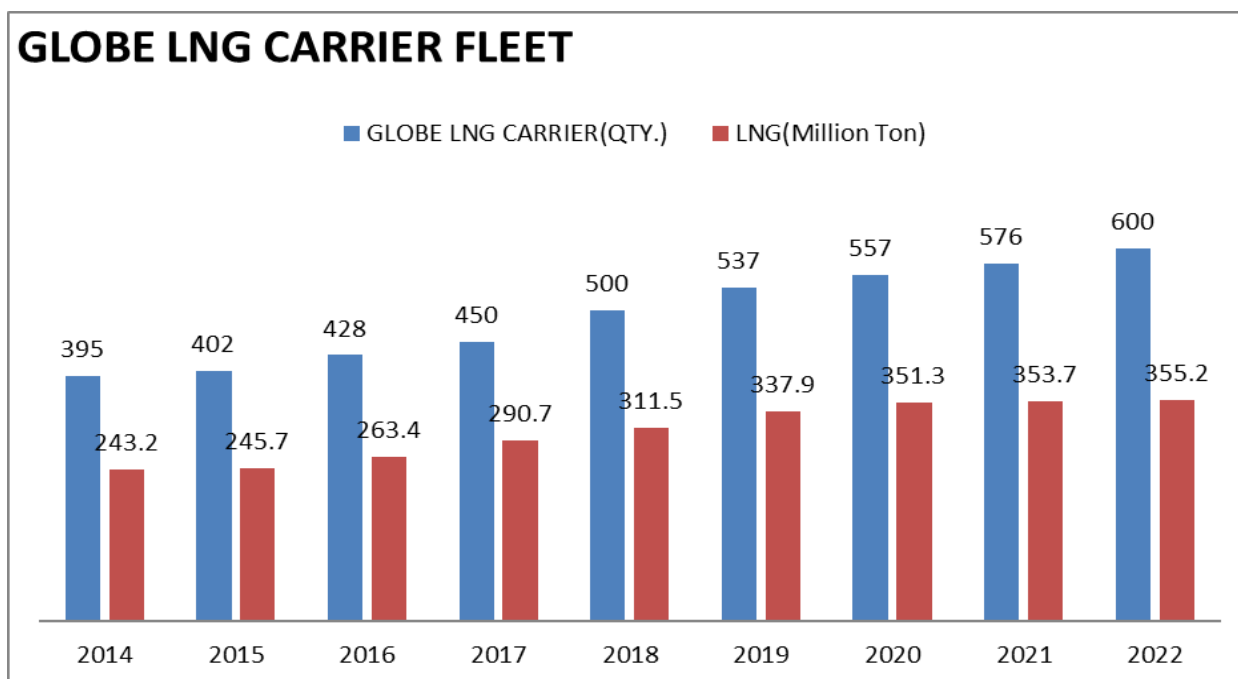


(Source: Internal Data)

There are two LNG shipping investment enterprises in China, with an invested total 38 LNG carriers and only 23 of them are dedicated for China market. There is an estimated shortage of about 40-80 LNG carriers that would be required for China LNG import demand in the next decade.

From the Shanghai Shipping Exchange Bulletin, the figures prove that the global LNG trade has grown rapidly in recent years, supporting the increasing use and availability of natural gas. The total number of global in-service LNG fleet, including large LNG carriers, midsize and small-scale vessels, is expected to reach 537 vessels in this year (2019), and will reach 600 vessels by 2022.

Graph 2.2 Globe LNG Carrier Fleet



(Source: Shanghai Shipping Exchange Bulletin)

2.2 The distribution of LNG to end users

The LNG industry in China commenced relatively later, particularly the transportation section, the infrastructure for the distribution of LNG to the end users is developing. The most effective and efficient way is through a pipeline network; however, the city gas enterprise owns the local pipelines and main pipelines between different locations are still under construction. LNG imported into the coastal main LNG receiving terminals, will pass through the local pipeline system, distributed to the surrounding area users. A large part of LNG is being transported by LNG trucks, there are about 13,000 LNG trucks in China to transfer LNG to the end users.

China has an extensive inland river route. The Government is encouraging the river boats change the fuel to LNG. For this purpose, the Government is planning to build some small LNG terminals in the rivers. As well, some companies are studying LNG re-loading from the coastal main LNG terminals to the small LNG terminals in the rivers using small LNG vessels.

LNG bunkering is also a very hot topic in China at this moment.

3. The Challenges for the LNG industry

As we all know, LNG is a typical chainlike industry, which forms a complete industrial chain from upstream exploration and development to mid-stream storage and transportation and downstream distribution. Any shortcomings and problems in any link will affect the smooth operation of other links. At present, the prominent problems in China's LNG industry chain mainly include the following aspects:

- 1) LNG storage capacity contributes to the deficiency of LNG shipping supply's during seasonal fluctuations, under capacity in winter and over capacity in summer of LNG shipping.
- 2) LNG pipeline infrastructure has a low level of connectivity, effecting LNG utilization levels, which cannot get timely adjustments.
- 3) LNG market trading mechanism is imperfect, limiting the development of LNG industry investment.

However, we think that the biggest challenge is the rapid development of the LNG industry in China, with a shortage of experienced staff. The experienced staff shortages include, experienced commercial staff, technical staff, management staff, particularly for shipping and experienced LNG experienced sea staff.

LNG ships are known as the "three high" products in the shipping industry. In addition to the "high added value" attribute, the "high technology and high difficulty" attribute puts forward higher requirements for LNG ship managers and operators, and also determines that they must have compound talents, who know both technology and management.

There is no doubt that as the first Chinese LNG ship management company, China LNG Shipping (International) Company Limited (CLSICO) has successfully operated six LNG ships for more than 10 years. At the same time, it has also trained a large number of excellent LNG staff for China's LNG ship transportation industry. However, there is still a huge gap between China's LNG shipping staff and the actual needs, compared with the huge increase in LNG shipping demand.

At present, we can only make up this crew gap through two measures. First, attract foreign LNG shipping staff to join China's LNG shipping industry in accordance with international standards or higher. The second is to attract and train more and more Chinese to join the LNG shipping industry by publicizing LNG ships. In fact, there are still a series of problems in LNG sea staff training in China, such as inadequate training facilities, lack of pertinence and practicality of training, and imperfect training system, which need to be further addressed.

4. Experiences from CLSICO

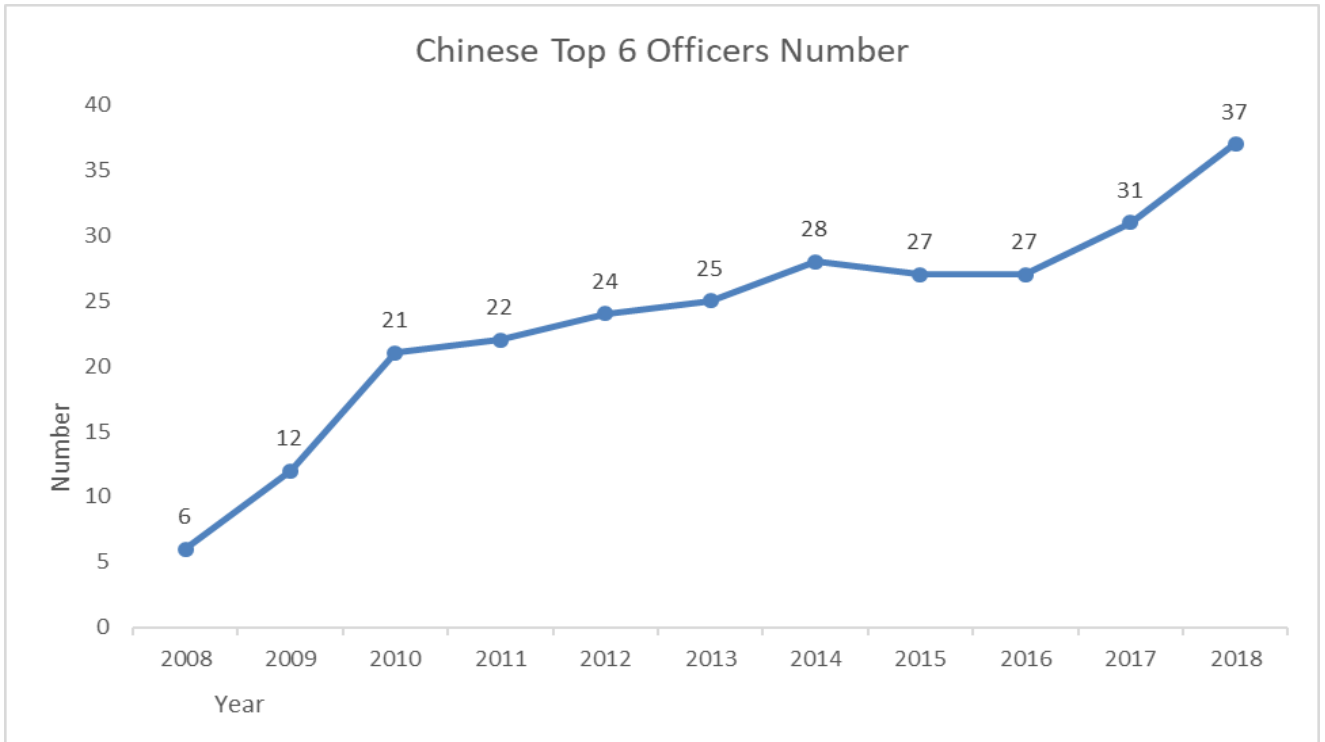
On managing the shortage of experienced LNG human resource, CLSICO has set up its own way to overcome this challenge.

Upon CLSICO's establishment in 2005, initially a Joint Venture with a Technical Support Agreement with BP Shipping, which provided a mechanism to develop both shore staff and sea staff for CLSICO.

For shore staff, two and half years ahead of the first LNG vessel was taken over, CLSICO selected two staff with Oil Tanker management experience to attend BP Shipping headquarters for a six-month's studying program on LNG ship management. After studying, they returned to CLSICO and entered the management level.

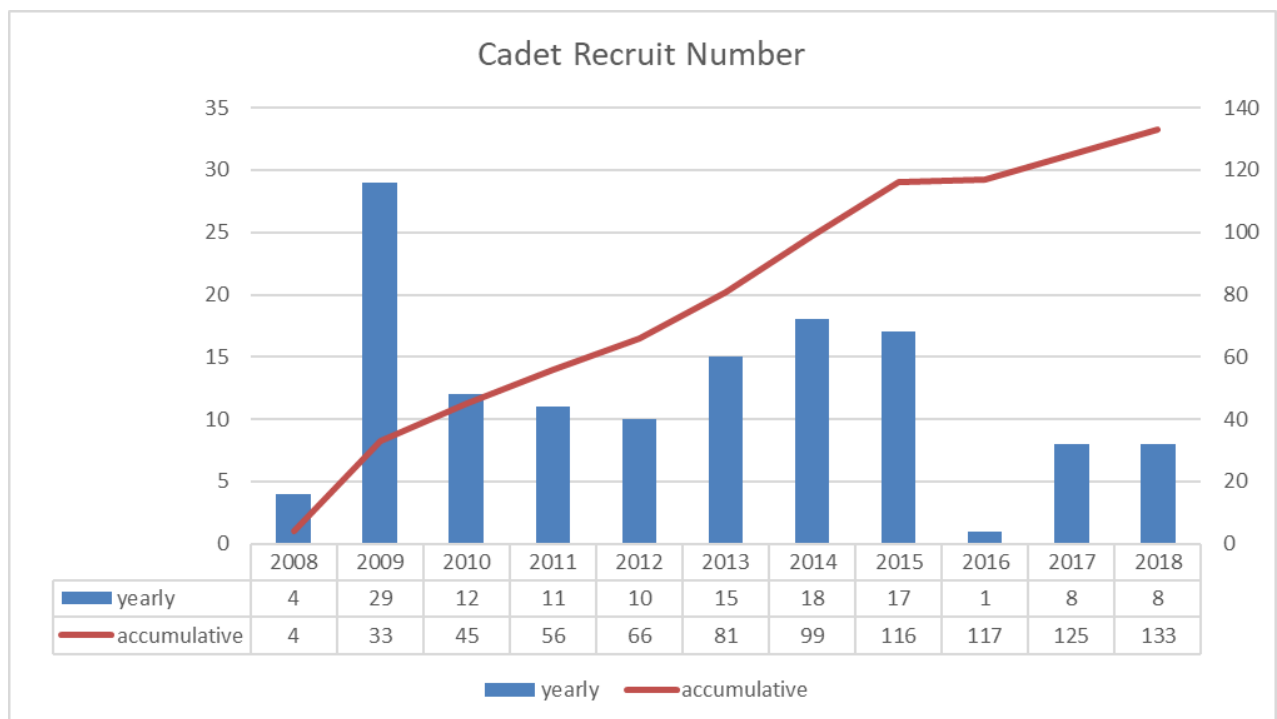
In the first five years, the main management personnel were provided by BP Shipping both for office and sea staff. The main working assignment for Chinese staff was to assist and learn through experience. After comprehensive training and developing, Chinese staff are gradually taking over the management level in each Function Unit in the company.

Graph 4.1 Chinese Top 6 Officers Number



(Source: Internal Data)

Graph 4.2 Cadet Recruit Number



(Source: Internal Data)

For Chinese sea staff, CLSICO selected experienced Tanker/LPG junior officers who were sent to BP Shipping oil tankers/LNG carrier's fleet, for training for a minimum of two trips. They then participated in taking delivery of the new LNG carriers which CLSICO was to manage. At the vessel's delivery stage, senior sea staff (Master,

Chief Engineer, Chief Officer, Second Engineer, Gas Engineer, Electrician Officer) sailing on CLSICO LNG vessels, were seconded from BP Shipping as part of the Joint Venture agreement.

CLSICO commenced management the first LNG vessel from 3rd April 2008, initially having one Senior Chinese sea staff Officer and by the end of 2018, CLSICO have now 37 Senior Chinese sea staff Officers including Masters and Chief Engineers.

CLSICO has now over 10 years LNG ship management experience and is today solely operated by CLSICO staff both ashore and at sea, the BP joint venture agreement having concluded.

The above two graphs represent the development of Chinese Sea Staff within CLSICO, Senior Officers Number Change and the number of Chinese Cadets, CLSICO has trained.

5. Conclusion

In conclusion, in the foreseeable future, China's LNG shipping industry will face great opportunity and challenge. The challenge can be overcome by working together! And the opportunity not only belongs to China shipping enterprises, China's energy enterprises and China's LNG shipping practitioners, but also belongs to anyone who intends to contribute to China's LNG shipping industry.